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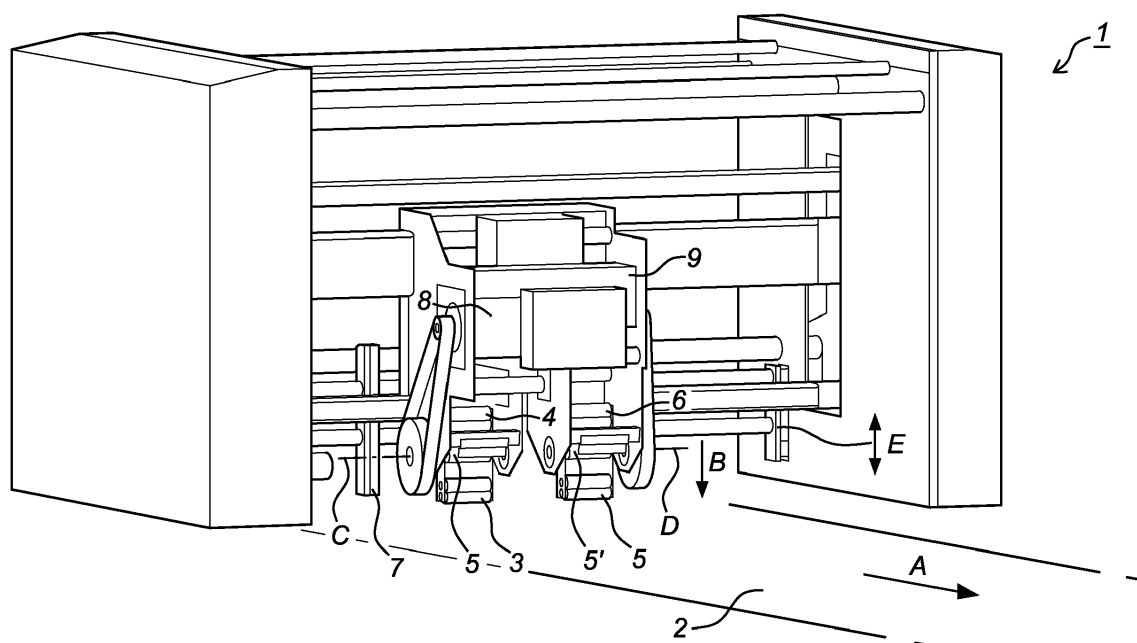
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Remarks:  
Amended claims in accordance with Rule 137(2) EPC.

(54) **Device and method for pressing a dough part**

(57) The present invention relates to a method and device for pressing at least one dough part, such as a croissant, comprising a conveyor, for conveying dough parts in a direction of movement; at least one press stamp, arranged movable with at least a component in a

direction towards a surface of the conveyor for pressing the dough part and wherein the press stamp is further arranged movable with at least a component in the direction of movement of the dough part.



**Fig. 1**

## Description

**[0001]** The present invention relates to a device and method for pressing a dough part.

**[0002]** Pressing, pinching, punching (or squeezing or clamping together of) dough parts commonly takes place in processes where dough parts should be adjacent or connected during at least a part of a preparation or baking process. In the process of baking croissants for example, the tips of the legs of a croissant are pinched in order to keep the croissant in its curved form, despite of a bias or tension in the dough that tends to straighten the dough product. During the baking, the tips of the legs may or may not separate or be separated again.

**[0003]** The benefit of a pressing or pinching operation as such is known per se. The European Patent EP 2 316 270 by the present applicant discloses a method and device for pinching dough parts, in particular tips of the legs of a croissant. This method has proven to be effective in many cases, but a need for further improvement is felt, in particular when it is not desired that the tips of the legs of a croissant separate. The international patent application WO 2011/144191 discloses a device for forming dough pieces comprising a shaft that pinches dough parts. However, the solution proposed in this document brings the risk of damaging the dough parts, either by leaving an undesired mark on them, or by smearing the dough over the conveyor band.

**[0004]** It is a goal of the present invention to provide a method and device for pressing a dough part that lacks the above disadvantages.

**[0005]** A first improvement to the state of the art would be to provide the shaft from the above mentioned state of the art WO 2011/144191 with a roller, and to arrange and apply it at a location where the dough is moved. This way, the dough is pressed during conveyance, with a roller that is movable towards the conveyor. Such roller has the advantage that it is automatically turned by the dough so that its surface follows the dough surface, which leads to a reduced chance of damaging the dough parts and products. However, an even more sophisticated solution is aimed at.

**[0006]** The invention thereto proposes a device for pressing at least one dough part, such as a croissant, comprising a conveyor, for conveying dough parts in a direction of movement, at least one press stamp, arranged movable with at least a component in a direction towards a surface of the conveyor for pressing the dough part, wherein the press stamp is further arranged movable with at least a component in the direction of movement of the dough part.

**[0007]** By simultaneously moving the press stamp with a component in the direction of movement of the dough part while moving it towards the surface of the conveyor, the resulting relative movement with respect to the dough part is merely or even entirely pointed towards the conveyor. This leads to a (com)pressed dough part, but smearing or other damage as a result of mutual move-

ment of the dough part and the press stamp in the direction of conveyance is avoided. It is to be noted that the pressing movement is directed towards the conveyor, but in general, the press stamp does not reach the conveyor surface, but leaves a predetermined gap, in order not to cut the dough piece. The size of the gap may be adjustable, and be set according to a specific dough product. The device according to the invention is in particular useful, and intended for pressing two (or more) parts of a dough piece against each other, so that they adhere during the further bakery process.

**[0008]** In order to automate the pressing of the dough, the device may comprise a sensor for providing a control signal upon sensing a presence of the dough parts, arranged upstream in the direction of conveyance with respect to the press stamp, as well as a controller, for driving the press stamp based on the control signal. Depending on the speed of the rotation and the distance between dough parts on the conveyor, the press stamp may be operated to move continuously, of to perform press actions and be halted in between.

**[0009]** In an embodiment, the press stamp is arranged rotary above the conveyor. Such rotary movement combines vertical and horizontal displacement. In particular, the controller may be configured for synchronising the speed of the press stamp in the direction of movement of the dough part with the speed of the conveyed dough part, at least during contact of the press stamp with the dough part.

**[0010]** In the most simple form, the speed of the surface of the press stamp is set equal to the horizontal speed of the conveyor. However, a more accurate and therefore preferred control algorithm adjusts the rotary speed of the press stamp in order to keep the horizontal component of the speed of the press stamp and the conveyor during dough contact equal. Thereto, the rotary speed of the press stamp needs to be increased while approaching the dough and while moving away from the dough.

**[0011]** Further improvement to the state of the art is obtained by shaping at least a part of the contact surface of the press stamp in a curved way, with a radius corresponding to the distance from its axis of rotation to the surface. That way, a constant compression and/or depression of the dough piece is obtained over the distance it is engaged by the press stamp.

**[0012]** This above mentioned distance is determined by the length of the press stamp, or the angle over which the radius corresponds to the distance from its axis of rotation to the surface. This angle may for instance extend between 20 and 60 degrees, and in particular between 35 and 50 degrees. A leading and lagging edge of the of the stamp part are rounded, with a smaller radius than the distance from its axis of rotation to the surface. In particular, the leading edge may have a larger radius than the lagging edge. The above mentioned distance may be between 20 and 60 mm, and in particular between 35 and 50 mm.

**[0013]** In a preferred embodiment, two or more press

stamps are arranged about the same axis of rotation. No entire rotation of a press stamp is required with such configuration between two dough parts that need to be (com)pressed, so the device can be operated quicker and it has a better weigh balance, leading to lower oscillation and energy use.

**[0014]** Furthermore, multiple press stamps can be arranged next to each other, in a direction perpendicular to the direction of movement of the dough parts, to allow multiple lanes of dough parts to be pressed in parallel.

**[0015]** Since each lane may have its own sensor, and dough parts may not be exactly outlined, individual drives can be preferred. Also, the distance between the dough parts in the width of the conveyor and the amount of parallel lanes may vary. Therefore, the amount of press stamps and their mutual distance may be adjustable too, and press stamps next to each other may be configured to be nested, for instance by having mutually different orientations of drives and/or control units or mechanical parts.

**[0016]** Since dough lines may be used for the production of various products, it may be desired not to use the press stamps at certain times, and, when they are in use, the distance to the conveyor belt may also be subject to variation per product. Therefore, the height of the press stamp above the surface of the conveyor belt is adjustable.

**[0017]** As stated above a main purpose of the device according to the invention may be to (further) stick parts of a dough part together. This effect can further be increased when a cross section of the press stamp in a direction perpendicular to the direction of movement has an at least partly concave surface. Such surface, which may in an extreme form even be triangular, forces the dough to a centre, instead of spreading it. However, in practice, a flat cross section has shown to be effective already, in particular when the dough part had an earlier processing step, wherein, for instance, the tips of the legs of a croissant were pinched together. For that reason, the device according to the invention may comprise a pair of drivable pinchers, movable with at least a directional component towards each other, arranged upstream in a direction of movement of the dough part with respect to the press stamp, as described in the European Patent EP 2 316 270, which is hereby incorporated by reference.

**[0018]** The invention will now be elucidated into more detail with reference to the following figures. Herein:

- Figure 1 shows a perspective overview of a device according to the invention;
- Figures 2a-i show a cross sections in the direction of movement of a dough part of embodiments of press stamps according to the present invention;
- Figure 3a, b show a cross section perpendicular to the direction of movement of a dough part of different rotatable press stamps according to the invention; and

- Figure 4 shows a graph with a control setpoint of the speed of a rotational press stamp according to the present invention.

**[0019]** Figure 1 shows a perspective overview of a device 1 according to the present invention. The device comprises a conveyor 2, for conveying dough parts (not depicted) in a direction of movement A, a number of press stamps 3, 4, 5, 6, arranged movable with at least a component in a direction B towards a surface of the conveyor for pressing the dough part, which press stamps 3, 4, 5, 6 are further arranged movable with at least a component in the direction of movement A of the dough part. The press stamps 3, 4, 5, 6 are arranged rotary above the conveyor, about axis of rotation C and D. The device further comprises sensors 7 (other sensors not visible in this view) for providing a control signal upon sensing a presence of the dough parts, arranged upstream in the direction of conveyance A with respect to the press stamps 3, 4, 5, 6, and a (non depicted) controller, for driving the press stamps 3, 4, 5, 6 based on the control signal.

**[0020]** As visible in the picture, press stamps 3, 4 and 5, 6 are arranged rotational about the same axis of rotation (C, D respectively). In the embodiment shown, axis C and D do not coincide, still press stamps 5 and 6 are arranged next to press stamps 3 and 4 in a direction perpendicular to the direction of movement of the dough parts. The press stamps next to each other are configured to be nested, by having mutually different orientations of drives 8, 9. The height E of the press stamps 3, 4, 5, 6 above the surface of the conveyor belt 2 is adjustable.

**[0021]** Figure 2a shows that at least a part F of the contact surface of the press stamps 3, 4 is curved with a radius R corresponding to the distance from its axis of rotation to its surface. In general, the part of the contact surface of the press stamp that is curved with the radius corresponding to the distance from its axis of rotation to the surface extends between 20 and 60 degrees, and in particular between 35 and 50 degrees. The present example shows about 35 degrees. A leading 11, 12 and lagging 13, 14 edge of the press stamp 3, 4 are rounded, with a smaller radius than the distance from its axis of rotation to the surface. The leading edge has a larger radius than the lagging edge. The figure also shows two possible positions of a scraper S and S1, for scraping the press stamp. Scraper S1 has the advantage that when the orientation of rotation O is applicable, remainings can be caught before they fall onto the conveyor or other dough parts. In case it is not possible to collect these remainings, and it is not considered problematic when the remainings fall on the conveyor, the position of S is chosen.

**[0022]** Figures 2b-2i show a variety of alternative possible forms of the cross section of the press stamp in a direction of conveyance. The press stamps are to rotate about their respective axis of rotation Ob-Oi. Embodiments with one or two stamps are shown, but for each

of these embodiments goes that multiple stamps per axis are thinkable too.

**[0023]** Figure 3a shows a cross section of press stamp 3 perpendicular to the direction of movement / conveyance of a dough part. The press stamp has an essentially flat cross section X1 of its surface. The tips of the legs of the croissant 15a, 15b that forms the dough part are merged, but also spread a little.

**[0024]** Figure 3b shows a cross section of alternative press stamp 3' perpendicular to the direction of movement / conveyance of a dough part. The press stamp has an essentially concave cross section X2 of its surface. The tips of the legs of the croissant 16a, 16b that forms the dough part are merged stronger than tips of the legs 15a, 15b from figure 3a.

**[0025]** Figure 4 shows a graph with a controller set point of the speed of a rotational press stamp, wherein the speed of the press stamp in the direction of movement of the dough part is synchronised with the speed of the conveyed dough part, by increasements before (J) and after (G) its closest position (H) to the conveyor.

## Claims

1. Device for pressing at least one dough part, such as a croissant, comprising:

- a conveyor, for conveying dough parts in a direction of movement;
- at least one press stamp, arranged movable with at least a component in a direction towards a surface of the conveyor for pressing the dough part;

### characterised in that:

- the press stamp is further arranged movable with at least a component in the direction of movement of the dough part.

2. Device according to claim 1, wherein the press stamp is arranged rotary above the conveyor.

3. Device according to claim 1 or 2, comprising:

- a sensor for providing a control signal upon sensing a presence of the dough parts, arranged upstream in the direction of conveyance with respect to the press stamp;
- a controller, for driving the press stamp based on the control signal.

4. Device according to any of claims 1-3, wherein the controller is configured for synchronising the speed of the press stamp in the direction of movement of the dough part with the speed of the conveyed dough part, at least during contact of the press stamp with

the dough part.

5. Device according to claim 2, wherein at least a part of the contact surface of the press stamp is curved with a radius corresponding to the distance from its axis of rotation to the surface.

6. Device according to claim 5, wherein the part of the contact surface of the press stamp that is curved with the radius corresponding to the distance from its axis of rotation to the surface extends between 20 and 60 degrees, and in particular between 35 and 50 degrees and/or between 20 and 60 mm, and in particular between 35 and 50 mm.

7. Device according to claim 5 or 6, wherein a leading and lagging edge of the stamp part are rounded, with a smaller radius than the distance from its axis of rotation to the surface.

8. Device according to claim 7, wherein the leading edge has a larger radius than the lagging edge.

9. Device according to any of the preceding claims, wherein two or more press stamps are arranged rotational about the same axis of rotation.

10. Device according to any of the preceding claims, wherein two or more press stamps are arranged next to each other, in a direction perpendicular to the direction of movement of the dough parts.

11. Device according to claim 10, wherein the press stamps next to each other are configured to be nested, by having mutually different orientations of drives.

12. Device according to any of the preceding claims, wherein the height of the press stamp above the surface of the conveyor belt is adjustable.

13. Device according to any of the preceding claims, wherein a cross section of the press stamp in a direction perpendicular to the direction of movement has an at least partly concave surface.

14. Device according to any of the preceding claims, comprising a pair of drivable pinchers, movable with at least a directional component towards each other, arranged upstream in a direction of movement of the dough part with respect to the press stamp.

15. Device according to any of the preceding claims, comprising a scraper blade, for cleaning the press stamp surface.

16. Method for pressing at least one dough part, such as a croissant, comprising:

- conveying dough parts in a direction of movement;
- moving at least one press stamp, with at least a component in a direction towards a surface of the conveyor for pressing the dough part;

**characterised by:**

- moving the press stamp further with at least a component in the direction of movement of the dough part.

**17. Method according to claim 16, comprising:**

- rotating the press stamp, and
- synchronising the speed of the press stamp in the direction of movement of the dough part with the speed of the conveyed dough part, by increasing said speed before and after its closest position (H) to the conveyor.

**Amended claims in accordance with Rule 137(2) EPC.**

**1. Device for pressing at least one dough part, such as a croissant, comprising:**

- a conveyor, for conveying dough parts in a direction of movement;
- at least one press stamp, arranged movable with at least a component in a direction towards a surface of the conveyor for pressing the dough part wherein the press stamp is arranged movable with at least a component in the direction of movement of the dough part by being arranged rotary above the conveyor;
- a controller, configured for synchronising the speed of the press stamp in the direction of movement of the dough part with the speed of the conveyed dough part, at least during contact of the press stamp with the dough part

**characterised in that**

- a control algorithm adjusts the rotary speed of the press stamp in order to keep the horizontal component of the speed of the press stamp and the conveyor during dough contact equal.

**2. Device according to claim 1, wherein the rotary speed of the press stamp is increased while approaching the dough and while moving away from the dough.**

**3. Device according to claim 1 or 2, comprising:**

- a sensor for providing a control signal upon sensing a presence of the dough parts, arranged upstream in the direction of conveyance with re-

spect to the press stamp;

- a controller, for driving the press stamp based on the control signal.

**4.** Device according to any of the preceding claims, wherein at least a part of the contact surface of the press stamp is curved with a radius corresponding to the distance from its axis of rotation to the surface.

**5.** Device according to claim 4, wherein the part of the contact surface of the press stamp that is curved with the radius corresponding to the distance from its axis of rotation to the surface extends between 20 and 60 degrees, and in particular between 35 and 50 degrees and/or between 20 and 60 mm, and in particular between 35 and 50 mm.

**6.** Device according to claim 4 or 5, wherein a leading and lagging edge of the stamp part are rounded, with a smaller radius than the distance from its axis of rotation to the surface.

**7.** Device according to claim 6, wherein the leading edge has a larger radius than the lagging edge.

**8.** Device according to any of the preceding claims, wherein two or more press stamps are arranged rotational about the same axis of rotation.

**9.** Device according to any of the preceding claims, wherein two or more press stamps are arranged next to each other, in a direction perpendicular to the direction of movement of the dough parts.

**10.** Device according to claim 9, wherein the press stamps next to each other are configured to be nested, by having mutually different orientations of drives.

**11.** Device according to any of the preceding claims, wherein the height of the press stamp above the surface of the conveyor belt is adjustable.

**12.** Device according to any of the preceding claims, wherein a cross section of the press stamp in a direction perpendicular to the direction of movement has an at least partly concave surface.

**13.** Device according to any of the preceding claims, comprising a pair of drivable pinchers, movable with at least a directional component towards each other, arranged upstream in a direction of movement of the dough part with respect to the press stamp.

**14.** Device according to any of the preceding claims, comprising a scraper blade, for cleaning the press stamp surface.

15. Method for pressing at least one dough part, such as a croissant, comprising:

- conveying dough parts in a direction of movement; 5
  - moving at least one press stamp, with at least a component in a direction towards a surface of the conveyor for pressing the dough part;
  - moving the press stamp further with at least a component in the direction of movement of the dough part; 10
- characterised by**
- rotating the press stamp, and
  - synchronising the speed of the press stamp in the direction of movement of the dough part with the speed of the conveyed dough part, by increasing said speed before and after its closest position (H) to the conveyor. 15

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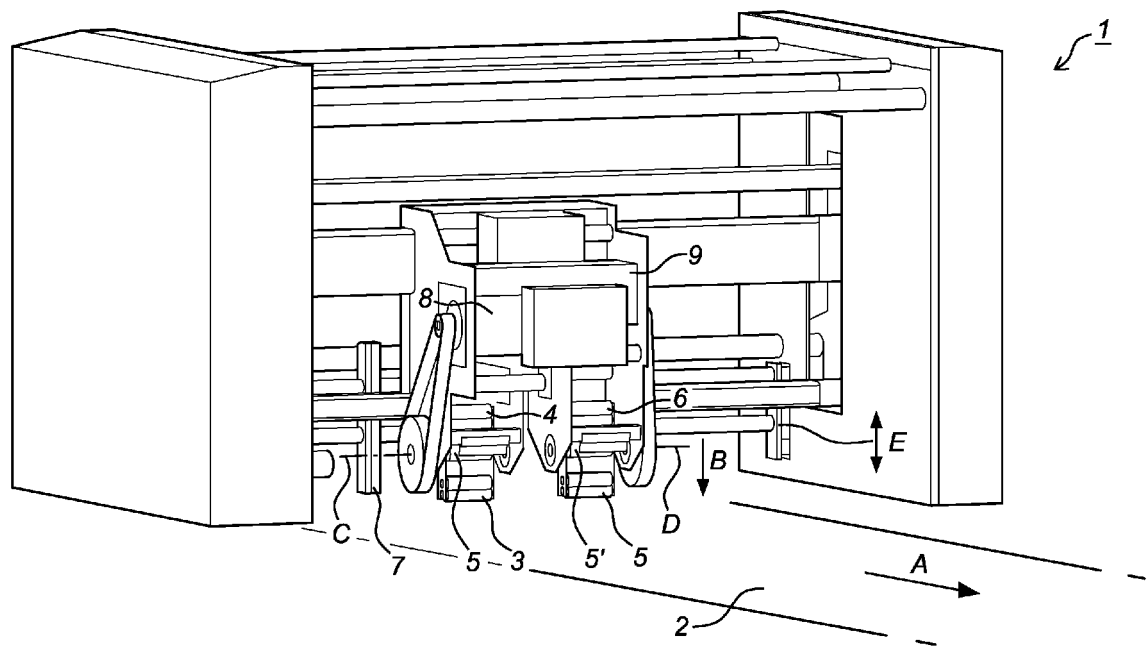


Fig. 1

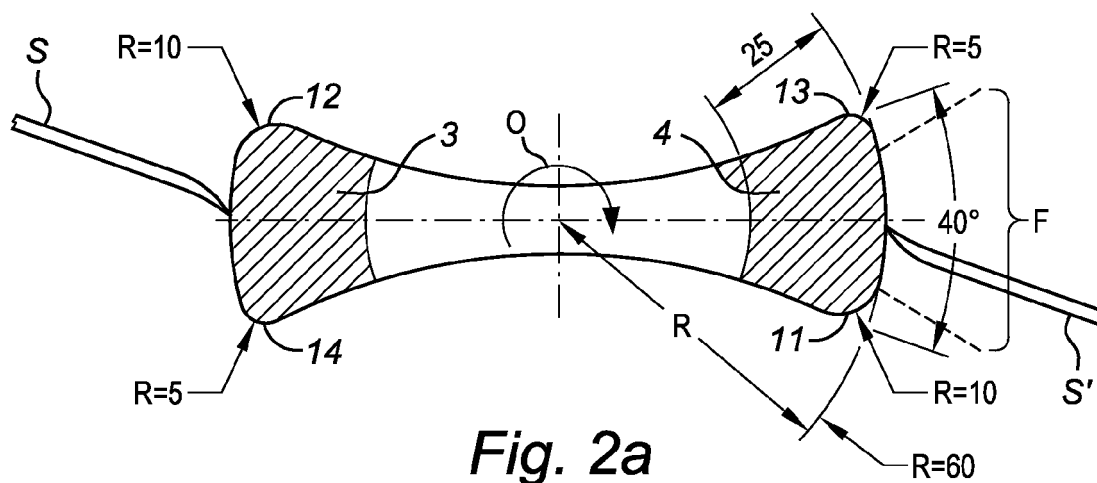


Fig. 2a

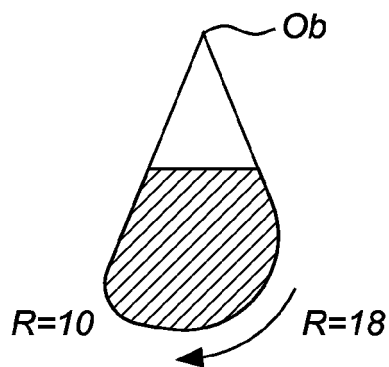


Fig. 2b

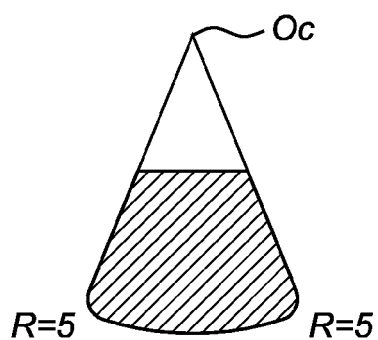


Fig. 2c

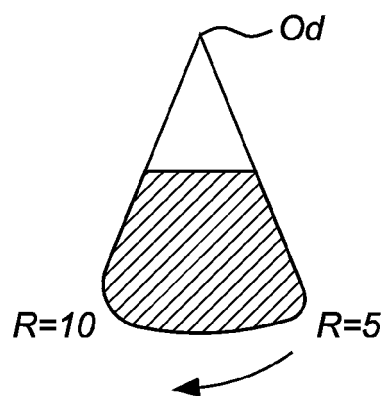
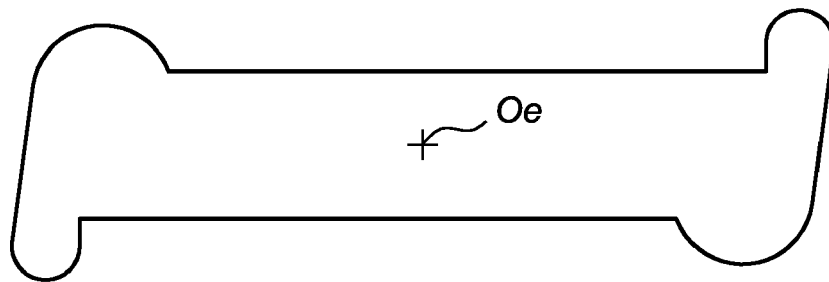
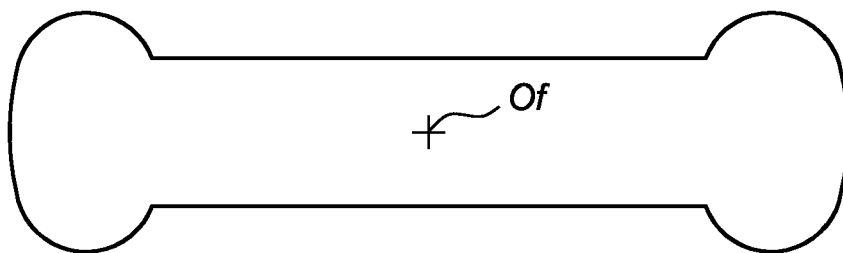


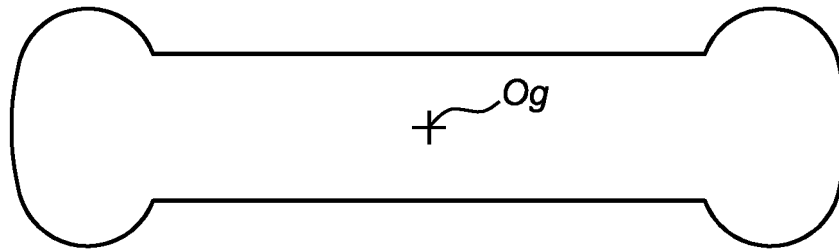
Fig. 2d



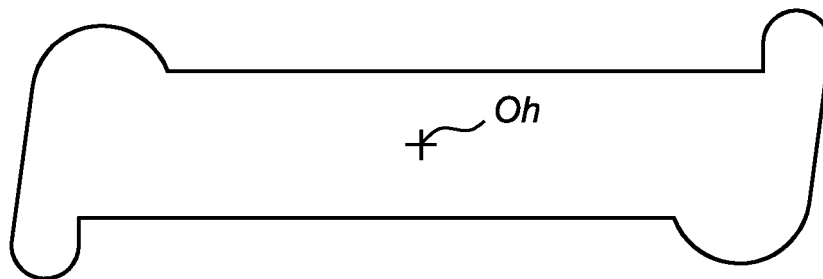
*Fig. 2e*



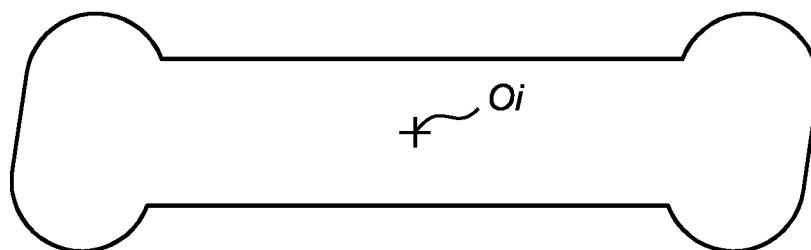
*Fig. 2f*



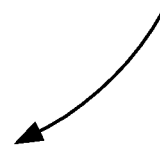
*Fig. 2g*

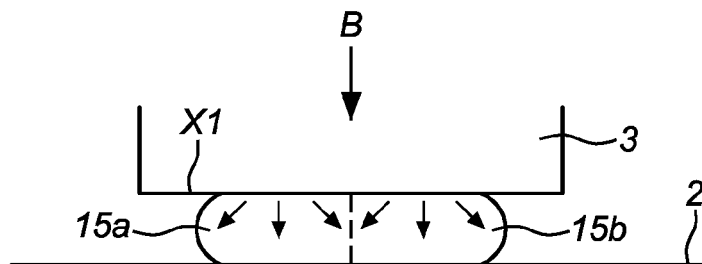


*Fig. 2h*

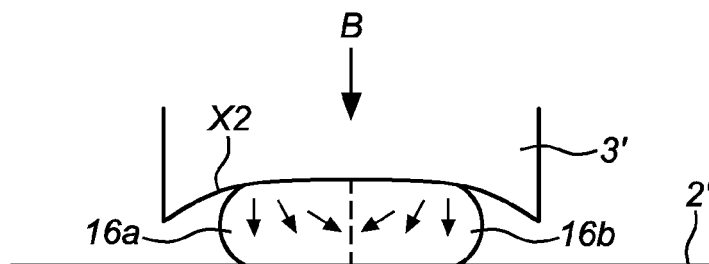


*Fig. 2i*

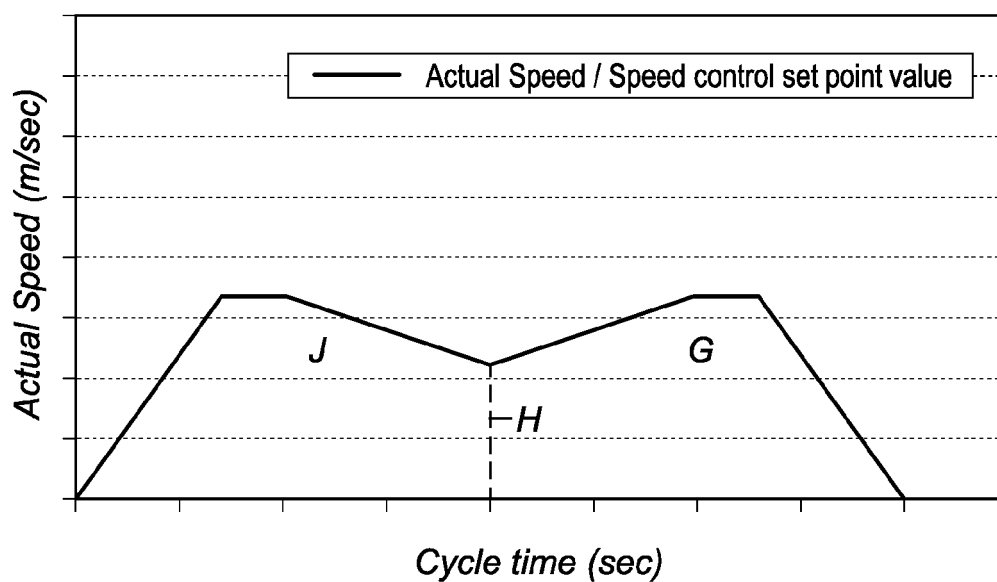




*Fig. 3a*



*Fig. 3b*



*Fig. 4*



## EUROPEAN SEARCH REPORT

Application Number  
EP 14 16 8183

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                             |                                                      |                                                                                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|---------------------------------------------------------------------------------|
| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Citation of document with indication, where appropriate, of relevant passages                                                                                                                                                                               | Relevant to claim                                    | CLASSIFICATION OF THE APPLICATION (IPC)                                         |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | US 7 178 456 B1 (BRYAN WILLIAM ROY [US])<br>20 February 2007 (2007-02-20)<br>* column 1, line 44 - column 2, line 4 *<br>* column 2, line 25 - line 43 *<br>* figures *                                                                                     | 1-17                                                 | INV.<br>A21C3/02<br>A21C3/06<br>A21C9/08<br>A21C11/00<br>A21C11/04<br>A21C11/08 |
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| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                             |                                                      |                                                                                 |
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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                             |                                                      | A21C                                                                            |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                             |                                                      |                                                                                 |
| Place of search<br>The Hague                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                             | Date of completion of the search<br>5 September 2014 | Examiner<br>Haegeman, Marc                                                      |
| CATEGORY OF CITED DOCUMENTS<br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document<br>T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>& : member of the same patent family, corresponding document |                                                                                                                                                                                                                                                             |                                                      |                                                                                 |

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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EP 14 16 8183

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**REFERENCES CITED IN THE DESCRIPTION**

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